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CENTRAL INTELLIGENCE AGENCY  
OFFICIAL ROUTING SLIP

TO	INITIALS	DATE
1	CTZ	9 Oct 61
2		
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1 to 2: John: Better check clearance needs, timing, etc. Keep to minimum. CTZ		
ACTION	DIRECT REPLY	PREPARE REPLY
APPROVAL	DISPATCH	RECOMMENDATION
COMMENT	FILE	RETURN
CONCURRENCE	INFORMATION	SIGNATURE

Remarks: Clide - on the basis  
of this from Stone, I'm  
contacting Tad to have him  
send in his draft of the T.D.  
to cover this effort.  
For your info.

Declass Review by NG

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FROM: NAME, ADDRESS AND PHONE NO.	DATE
	9 Oct 61

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5 October 1961

MEMORANDUM FOR: Chief, TP&DS

FROM: Chief, TISD

SUBJECT: [ ] Staff Study -- Technical Intelligence

REFERENCE: [ ] Staff Study -- Technical Intelligence Contract  
[ ] Assignment I, Technical Directive #2,  
dated 31 August 1961

After talking with you, [ ]  
[ ] I think that it would be time and money well spent to direct  
[ ] to proceed with this study. TISD does not have the personnel to ac-  
complish this work, and it seems to me this is a study that must be done  
if we are to be in a position to put into operation, and get the most out  
of our new computer. As you figured out, the cost would run about [ ]  
but I think it would be money well spent.

[ ]  
Chief, TISD/NFPC

NPIC/TISD [ ] (5 October 61)

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TO	NAME AND ADDRESS	INITIALS	DATE
1		S.S.	
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ACTION	DIRECT REPLY	PREPARE REPLY
APPROVAL	DISPATCH	RECOMMENDATION
COMMENT	FILE	RETURN
CONCURRENCE	INFORMATION	SIGNATURE

Remarks: Steve - I strongly recommend that OPIC direct DUSA to proceed with this effort. Ralph, Chris, & John W. are familiar with premises [redacted] work in this area. Would like to discuss next steps if you feel advisable. There is of the whatever!

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	13 Sept 61

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31 August 1961

STAFF STUDY -- TECHNICAL INTELLIGENCE

Assignment I, Technical Directive #2

I. Statement of the Problem

Forthcoming technical intelligence assignments are expected to increase significantly in volume and at the same time to require increasingly complex analysis. Various solutions to this problem have been analyzed in three reports by [ ]

- A. "A Special Report on the Technical Intelligence Requirements of PIC"
- B. "Preliminary Analysis of On-Line Technical Intelligence Operations"
- C. "A Scientific Computer - Criteria, Evaluation and Selection"

Briefly, it was concluded that (1) technical intelligence activities must be integrated into the normal flow of the intelligence process, and (2) a new scientific computer with capability for on-line real time computation was required. The primary problem forming the basis of the technical directive under study is the implementation of a new scientific computer system to fulfill these requirements.

II. Assumptions

Future coverage will pose severe photo analysis problems because of marked increases in:

- A. The sheer volume of technical intelligence problems, due not only to the type of coverage, but also due to nationalization of the Center.
- B. The complexity of the problems due to the extreme high altitude, small scale nature of the coverage, as well as the non-conventional (non-planar focal surfaces) type of imaging.

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### III. Facts Bearing on the Problem

Expanding from the foregoing assumptions, the requirement for a reorganization of technical intelligence activities around a new scientific computer system is based upon the following facts:

- A. High altitude, small scale photography is plagued by many sources of error. These errors, generally negligible at low altitudes, assume major significance, thus adding considerable complexity to former problems of a routine nature. "Eye-ball" methods can be extremely unreliable if applied to such coverage.
- B. Nationalization of PIC will expand the volume of technical intelligence problems several times in order to meet the demands of the Army, Navy and Air Force.
- C. While collection systems are expected to become more sophisticated, size and weight of airborne equipment packages are expected to remain limited for some time. Consequently, the brute force methods of increasing focal length and lens aperture will not be practicable in reducing the inherent high altitude, small scale problems. In addition, distortions due to atmospheric phenomena and earth shape cannot be corrected within the camera system.

*Add code 25X1  
and clearance?  
dr*

### IV. Discussion of the Facts

An analysis of technical intelligence activities in the past has indicated that almost 90% of the routine mensuration is done by the photo interpreters. Much of this is accomplished by so called "eye-ball" methods, which, if cautiously used, are somewhat effective on near-vertical moderate scale photography. These methods, however, can give very misleading results if applied to high altitude, small scale photography. In particular, short cut methods applied to panoramic coverage with all its inherent distortions, can lead to very erroneous results.

In analyzing a photograph, certain parameters about the photograph are required before any reliable information can be extracted. Some of these parameters are difficult to obtain. One of the longest programs now performed by the ALWAC is concerned with the determination of the exterior orientation from horizon photographs. With the onset of advanced collection techniques, the determination of the necessary information about the photograph becomes a major sphere of activity which must be integrated into the normal photo intelligence process.

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In addition to the information about the photograph, considerable attention must be applied to factors affecting the information obtained from the photograph. These factors are such things as atmospheric distortions, errors in obtaining camera position and orientation at the instant of exposure, film and lens distortions and any other phenomena affecting the reliability of technical intelligence extracted from the photograph. These factors can be analyzed by a mathematical process known as "error analysis". Such analysis will permit an assessment of technical intelligence quality by assigning statistical degrees of confidence to problem solutions. This type of analysis thus becomes a major sphere of activity in the photo intelligence process.

The preceding discussion has indicated the broadening in scope of problems analysis for future technical intelligence extraction. A study of the anticipated volume and complexity of these problems has indicated that a reorganization of technical intelligence activities about a new scientific computer is in order.

The basic premise underlying this reorganization is that technical intelligence must evolve into an on-line integral function in the normal photo intelligence process, instead of remaining relegated to a supporting role as at present. Furthermore, in keeping with the greatly expanded workload, real time solutions to problem inputs from a number of remote photo analysis stations will be required.

#### V. Conclusion

The implementation of a new scientific computer system to fulfill the requirements discussed above forms the basis for a separate technical directive. This technical directive should begin immediately and continue until the system is in self-sustaining operation. The task breakdown will include specifications, problems analysis, programming, facilities planning, personnel and training, remote station communication requirements, and functional design of any special peripheral equipment.

#### VI. Recommendation

It is recommended that a joint computer system implementation team be formed to execute the subject technical directive. This team should consist of representatives from TIB, PAD and [ ] will work closely with TIB in providing services pertaining to specifications, problems analysis, peripheral equipment design and integration, facilities planning, personnel and training and any other problems

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developing in the basic implementation plan. [ ] should also assist TIB in coordination with the computer vendor, peripheral equipment vendors, and a programming sub-contractor.

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## VII. Tentative Schedule

### A. Phase I (Issue Date to 30 June 1962)

1. Problem material (to be completed by 30 June 1962). Identify all problem requirements. Review all - existing mathematical material. Derive additional material as necessary. Document the total problem content of technical intelligence. Identify those that are computer applicable.
2. Computer specification (to be completed by 30 November 1961). Survey [ ] Observe operation of 490. Prepare specification for computer complex. (Request delivery on 31 March 1963. Operation by 30 June 1963.)
3. Programming (1 January 1962 continuing into FY 63). Establish parameters of total programming requirement. Coordinate with programming firm and [ ] Establish requirements for each. Simulate performance as required and as possible.
4. Special peripheral equipment specifications (to be completed by 30 June 1962). Establish requirements for input equipment with PAD/PAG. Coordinate with TIB and [ ] Prepare technical specifications. (Request equipment delivery on 31 March 1963.)
5. Facility requirements (to be established by 15 October 1961). Identify all equipment and communications requirements. Submit facility recommendations to A&E. Monitor production plans.
6. Personnel requirements (to be completed by 31 March 1962). Assist TIB in the identification of personnel requirements, as requested. Set up a schedule for the phase-out of [ ] and phase-in of a permanent computer staff.

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7. Training requirements (continuing into FY 63). Collect all problem material and indoctrination information. Identify material applicable for training purposes. Arrange training sessions as requested.
8. Production liaison (continuing into FY 63). Monitor the technical aspects of equipment production and building construction. Assist in final check-out as required.
9. Final check-out (continuing into FY 63). Establish all performance requirements. Prepare check-out procedure for total system. Jointly participate in simulations and check-out.

B. Phase II (1 July 1962 to 30 June 1963)

To be established.

VIII. Estimated Manpower Requirement for FY 62

Senior Engineer	-
Senior Member Technical Staff	-
Draftsman	-
Clerk-Steno	-
Total FY 62 Effort	-

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